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SELECTED ECONOMIC TRANSLATIONS  
ON CZECHOSLOVAKIA

(9th in the series)

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SELECTED ECONOMIC TRANSLATIONS  
ON CZECHOSLOVAKIA

INTRODUCTION

This is a serial publication containing se-  
lected translations on all categories of economic  
subjects and on geography. This report contains  
translations on subjects listed in the table of  
contents below.

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CZECHOSLOVAKIA

Coal Processing in Czechoslovakia and Its  
Development in the Third Five-Year Plan

[The following is a translation of part of an article entitled "Vyvoj Upravy Uhli v. CSR a Jeho Rozvoj ve Treti Petiletce" by Dr Engr F. Spetl and Engr E. Skapa, published in Paliva, Vol XL, No 3, March 1960, Prague, pages 65-67; CSO: 3924-N/a]

Although the growth in the capacity of new coal washing units was out of step with the growth of mining, in the Ostrava-Karvina district 1 May (UZK) mine we completed a fine-grain washing plant after the war and built a new 600-ton per hour washing plant in the CSA [Ceskoslovenska Armada] Mine in 1954. In addition to that, we rebuilt several older processing plants; in early 1959 we completed the reconstruction of the old discontinued washing plant in the Alexander mine. Two new washing plants are scheduled to be turned over for use during this year [1960] in the Doubrava and Zapotocky mines. The former will be equipped with a heavy plant for washing raw coal combined with the washing of fine coal in settling tanks; the latter will be strictly for heavy washing. A similar washing plant will be turned over for use in 1961 in the Gottwald mine, while the Dukla mine will start a combination washing operation in the same year.

A new processing plant was erected after the liberation in the Kladno district Nosek mine several old processing plants were rebuilt there as well as in other black coal mining districts.

In the Most mining district we turned over for use the first heavy processing plant for clay-soiled brown coal in 1954; it was the first such plant of its kind in the world and, with its capacity, it ranks among the largest processing plants in existence. The coal washed out of upper and lower lava beds as well as from waste from cave-ins yields hundreds of thousands of tons a year of quality coal that was formerly left unwashed and discarded. We also built or rebuilt several coal grading plants.

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In the Sokolov mining district we built a large grading plant at Tisova. The low ash-content dust from this grading plant will be processed in the neighboring briquette plant now being built for a capacity of 500,000 tons of briquette per year.

In spite of this new construction we still do not have a sufficient number of processing plants to cope with the increased mining output and the changed structure of raw materials. The shortage is felt primarily in the processing of the various coal types into coke; part of the fine raw dust (wings) and coal sediments are still either burned or remain unprocessed and get mixed with the coal to be washed. In the former case, the much needed coking substance is burned, while in the latter the ash content of the processed coal and thus of the coke is unnecessarily increased. The processing plants are overloaded, with resultant difficulties in the maintenance of equipment and poorer performance in the washing of fine coal and in the flotation plant. The higher water volume in the washed coal, caused by inadequate drainage facilities and by a large proportion of fine-grained coal, cuts its caloric value and lowers the furnace output in coking plants. We shall have to expand our coal washing facilities in the Most brown coal mining district, where a considerable volume of coal from soil beds is being dumped.

These are compelling reasons for extensive investment construction during the Third Five-Year Plan in the coal-processing sector, which in size and scope has never been matched by our country before. The expansion will benefit first of all the Ostrava-Karvina district; we plan to build new processing units here in 1962-1963 consisting of a heavy washing plant at the Jeremenko mine and a washing plant at the Fucik mine, to be equipped with installations of Czechoslovak make. In the same years we plan to rebuild the processing plants at Hlubina and Ludvik after which will follow the erection of new processing plants at Sucha-Stonava and Zofie. In addition to that, we shall rebuild, partially at least, the washing plants at Sverma, Karolina, and Victorious February (Vitezny Unor); they will be equipped or supplemented with new flotation facilities. The Urz washing plant is scheduled to be equipped with installations for washing fine-grained coal. The new facilities will take care of the coal carbonization process and will supplement in part the obsolete washing plants equipped for washing strictly coarse-grained grades. Additional construction of processing plants is planned after 1965. The newly erected washing plants will process coal up

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to 200 millimeters and will wash the two coal types separately. The difficult manual separation of barren parts in grading plans will be eliminated. All supplies for the construction of new processing plants will have to be delivered on time and in good quality to prevent the recurrence of difficulties and breakdowns that were so frequent in the deliveries of the first supplies.

In the Most district we shall build two new large processing plants--Hercules and Ledvice, in which we shall refine the rich coal from the Duchcov-Teplice-Bilina district by using ashes for washing, as is done now in the Komorany district. For the requirements of electric power plants we shall build in that mining district plants for grinding low-grade brown coal. In the district of southern Moravia, we shall build another plant for grinding lignite.

In the Sokolov mining district we shall start building a combined plant at Vresova, which will consist of a large grading plant as well as our largest briquette plant, with a capacity of one million tons of briquettes per year. We shall also rebuild the briquetting plant Gustav.

Thus, we are scheduling for the Third Five-Year Plan a vast investment construction (part of which has already been started) in the sector of coal processing and refining; coal mining operations are now ahead of coal processing facilities but the gap will be gradually bridged. Right now we are faced with a serious coal carbonization situation, referred to in an article by Comrade B. Koehler in the Rude Pravo of 6 February 1960. The new plants will process a good quality of coke from all coal suitable for carbonization; the new processing plants will produce sufficient coke for our own use and for all other socialist countries.

The new brown coal processing and briquetting plants turn out a better quality brown coal for households, industry, and transportation, and their new technologies will improve the utilization of our brown coal potential.

The new processing plants will be built with modern mechanization and automation facilities to eliminate heavy and labor-consuming work, such as sifting of lump coal by hand, washing operations, loading and moving cars, etc. We are engaged in research on preprocessing coal directly in the mine, leaving the stone underground and reducing the amount of surface dumping. Many problems are being studied by research and

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development institutes, among them the problem of automation devices ("feelers") to aid the production line in our processing plants--e.g., density and viscosity regulators of sediment and mud; high-speed analyzers of moisture, ash, and washability of coal and its products; devices indicating the volume of liquid in tanks or indicators recording the movement in emptying and storage bins. We have to follow closely some new processing methods, that use ultrasonic or electrohydraulic power in grinding ballast or preparing emulsions and the propulsion of vibrators; these methods are used with success abroad in transportation, unloading, etc. We are also stressing the importance of radioisotopes in recording processing methods.

The most important problem is the solution of the problem of draining fine-grained washed coal, flotation concentrates, and sediments in general. Foreign countries have developed many efficient and reliable sieve-type and fully covered type eccentric machines; at first they were frowned on, but eventually they found their way into our processing plants. The urgent need for coal drainage equipment places before our machine-building industry the task of developing our own eccentric unit to match the best foreign models. The flotation concentrates will have to be not only mechanically drained but also thermally dried.

We suppose that our research will have to take up again the dry processing of fine-grained coal; there coal does not come into contact with water and we have therefore no trouble with either sediment or waste water.

The problem of drying is being studied by our CSAV [Czechoslovak Academy of Sciences] Mining Institute (Hornický Ústav); among the problems studied are briquetting of brown coal; purification of waste waters from processing plants; mechanical processing of lump coal on the surface and underground; basic research on coal flotation and ballasts. Applied research is conducted by our Test Washing (Polusne Praklo) VVUU [presumably, Vyzkumny vedecky ustav uhli; Coal Research Institute] at Kincicky on drainage and separation of coal; processing of hydromechanically mined coal; automation of grading, grinding, and washing operations; verification of output parameters and technologic parameters in new and rebuilt washing plants.

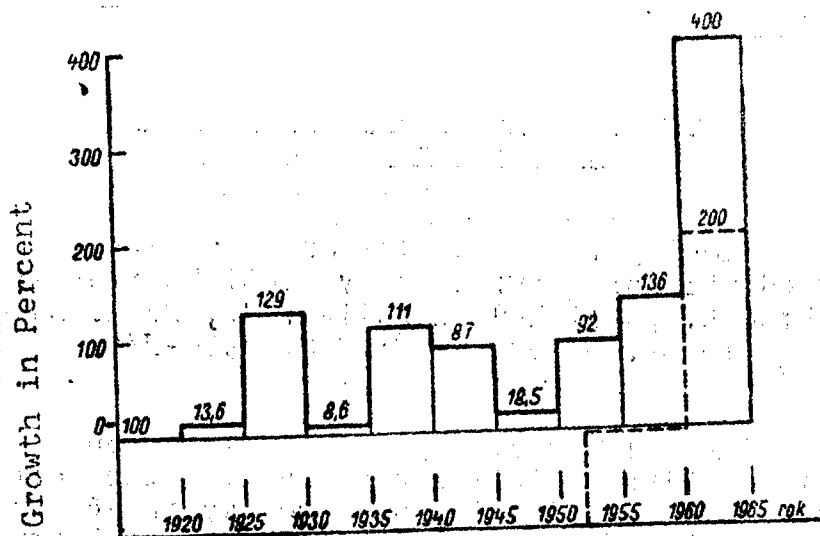


Figure 1. Growth of New Coal Washing Capacities in Czechoslovakia Since 1920

———— for black coal  
 ----- for brown coal

The two institutes cooperate with machine-building factories specializing in the manufacture of processing equipment. The designers and engineers are charged with the task of designing and building modern processing plants with devices transmitting by central remote control information on belt weights, loads, bins, etc. Experience has taught us that in the elementary system of operations in processing plants simple, well built machines of good quality will keep breakdowns at a minimum. Frequent breakdowns and a shortage of spare parts often paralyze our efforts toward mechanization and automation; the design and construction of machines must therefore be carried out with the utmost care.

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CZECHOSLOVAKIA

Gas Production and the Tasks of  
the Third Five-Year Plan

[The following is a translation of an article entitled "Plynarenstvi a Ukoly Treti Petiletky" by V. Hradek, published in Paliva, XL, No 3, March 1960, Prague, pages 67-68; CSO: 3924-N/b]

At this time all organizational levels of our national economy are working at full speed drafting the Third Five-Year Plan in order to develop our economy in accordance with directives of the KSC [Czechoslovak Communist Party] Central Committee and the Czechoslovak Government. Our aim is to increase production and labor productivity in order to increase our 1965 national income by at least 42 percent over 1960 and the consumption of our population by at least 30 percent. The population's real income is expected to rise by 20 percent (i.e., material consumption, direct services to the population, and services rendered by school, health, and other sectors). In the Third Five-Year Plan we shall furthermore gradually reduce the work week to 42 hours and to only 40 hours in underground mines. This impressive rise in the standard of living will require a 50-percent rise of our industrial output during the Third Five-Year Plan, whereby the output of means of production will be about 60 percent higher and the output of consumer goods will be about 30 percent. The Third Five-Year Plan emphasizes again the importance of the machine-building industry, of which the production is expected to rise by 72 percent. Among the other industries to be considerably increased are the metallurgical, chemical, fuel, and power industries. The development of these industries may be gauged according to their key products (in percent):

Black coal	120
Brown coal	132
Coke	138
Electricity	156
Pig iron	161
Steel	154
Nitrogenous fertilizer	202



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The total chemical production will rise by 86 percent. To make this industrial growth possible, we shall modernize existing plants and build several new plants.

The development of our industrial production will require large investment means. The volume of industrial investments in the Third Five-Year Plan will be 80 percent higher than in the Second Five-Year Plan.

The rise in our industrial production will be accompanied by higher labor productivity and lower production costs. The labor productivity will be up 40 percent thanks to the planned mechanization, automation, and new production technology. We shall build our new plants by following the world's most advanced indicators. We shall endeavor to reduce our annual industrial costs by 2.6 to 3 percent, mainly through savings on material, commodities, and higher labor productivity.

We are now busy drafting the Third Five-Year Plan for our gas production. We must be thoroughly prepared for the truly extraordinary tasks facing gas producers during the Third Five-Year Plan. These tasks include production and distribution of gas, building of gas works and gas facilities, and conversion of towns and industrial plants to the use of gas. The employees of gas works and allied organizations as well as other sectors will contribute to the fulfillment of these tasks.

By the end of the Third Five-Year Plan, the annual production of gas will rise to 3,300 million cubic meters or three times the present production. A growth of this magnitude cannot be accomplished with the existing production facilities. The increased gas production will therefore depend on the construction of new gasworks. The construction of new gas producing units is influenced by the prevailing tendency to concentrate gas production in large plants for the gasification of inferior brown coal under pressure, and also to process coking gas there. The gas so obtained would be supplied on a large scale by pressure through long-distance pipelines. The new large productive units will eliminate all small gasworks where gas is produced expensively by carbonization and where labor productivity is low. Since the Third Five-Year Plan makes provisions for increasing the imports of crude oil, there are signs of a new tendency in the production of gas using the method of splitting crude oil and its products. Plants using this method will be located in large gas-consuming centers to meet peak demands for gas or to supplement the supply of coking gas.

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The total annual capacity of new gasworks during the Third Five-Year Plan will reach 3,200 million cubic meters. We cite the expansion of the pressure gasworks in the Stalin Plant at Zaluži near Most, the completion of the pressure gasworks at Uzin near Usti nad Labem, and the erection of new pressure gasworks at Vresova near Sokolov. Among the units utilizing coking gas gained from new coking batteries, we cite the substantial expansion of the refining and compression station at Sucha near Ostrava and the erection of new stations at Trinec and Kosice. The new station at Kosice will be erected in conjunction with the construction of the new metallurgical plant for combined operations in eastern Slovakia. We shall build new plants involving splitting of crude oil in Prague, Brno, Ostrava, and Kosice--all of them centers consuming large volumes of gas. In the area of Ostrava and at Kosice, such new plants will supplement coking gas during the winter period.

To supply gas from the new gasworks to the centers of its consumption, we shall build a new 1,770-kilometer gas pipeline during the Third Five-Year Plan to increase the gas network by 65 percent. The most important new pipeline will be built between Vresova and Brno; it will be known as the southern main gas pipeline (jizni magistrála), supplying gas from the pressure gasworks at Vresova to the areas of Karlovy Vary, Plzen, southern Bohemia, Hlávka, and Brno. The first section of this pipeline between Vresova and Veselí nad Lužnicí will be completed by 1965. Another important pipeline between Ostrava and Brno will be linked at Brno to the one originating at Vresova and will create a unified system from Ostrava all the way to Vresova. We shall connect with this pipeline the underground coking gas storage tanks at Lobocice near Kojetín; they will be turned over for use during the Third Five-Year Plan and will considerably improve the economy with Ostrava's coking gas. In Slovakia we shall link the northwestern area of Slovakia with the Trinec-Zilina coking gas pipeline; we shall also build a system of pipelines in eastern Slovakia. There we shall start to build the important main gas pipeline between Ostrava and Kosice, scheduled for completion during the Fourth Five-Year Plan; this will link the gasworks of the Ostrava area with the gasworks of eastern Slovakia and open the door to mutual cooperation. It will then be possible to supply northern and central Slovakia with gas and reduce the natural gas supply area, because some consumers will be switched from natural gas to coking gas.

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The construction of the above described gas pipelines will create a statewide network of pipelines across the entire republic to supply gas to the major part of our national territory. The layout of the gas pipeline network will make it possible to bring more industry to the state's industrially undeveloped areas.

The development of our gas pipeline network will result in an expanded supply of gas to our population. The gas supply to our population has lagged behind the development of gas supplies to our industry and also behind other countries with advanced gas production, in spite of the highly tangible results achieved in the past few years. Our expanded gas potential will be of great importance to our new apartment construction project, which will average 100,000 units per year. The major part of the new apartments will be built in towns where gas will be available. We estimate that 73 additional towns will be supplied with gas, bringing to 236 the total of towns to which gas will be made available. The Third Five-Year Plan therefore adds 300,000 more households to be supplied with gas and the number of gas consumers will rise to more than one million by 1965. About 25 percent of our population will then benefit from gas fuel. The realization of the plan is based on a vast municipal gas network construction that will reach approximately 2,700 kilometers during the Third Five-Year Plan.

This development of our gas production will require large investments from the national economy which will be 81.5 percent higher than in the Second Five-Year Plan. The magnitude of the investment plan indicates the extent of the gas production investment construction, which has become the key problem in the development of the entire industrial sector. The problem is complicated by the fact that 70 percent of the investments are appropriated for production investments in chemical facilities; the point is that we plan a dramatic development of our chemical industry and the demands that will be made on this industry are really big. Large amounts will be invested in costly technological equipment and new facilities for crude oil processing. The investment construction of our gas production will therefore have to be thoroughly planned and executed on all organizational levels. At this stage of planning for our Third Five-Year Plan gas production, we are concerned not only drafting the general plan but with detailed specifications for individual investment products backed up by design, materials, and engineering know-how. Only if we are able to fulfill this task on time will our investment construction and the development of our gas production be successful.

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As in our national economy, our gas production also aspires to attain a certain production standard and the maximum degree of efficiency in production. Gas production is therefore charged with the task of increasing labor productivity during the Third Five-Year Plan by at least 48.4 percent and reducing production costs by an average of 2.14 percent. We therefore have to build our new production plants economically by reducing the proportion of buildings in the over-all investment expenditures, by increasing mechanization and automation, and by using the latest production technology. We have to realize that we are building the new plants not only for the present but for the coming 20 to 30 years, and what appears modern today will become obsolete and we will wonder why we built this or that the way we did. Part of our investment expenditures will be appropriated for the modernization of existing facilities and for increasing output. In our effort to reduce production costs we shall realize savings on commodities, materials, and power; we shall therefore endeavor to make the best of our thermal and gas potential and to utilize all waste heat. In the gas supply system we shall reduce the consumption of gas pipe material per 1,000 cubic meters and per consumer per year as well as cut back on gas wasted in distribution where losses still run quite high.

We have to understand the connection between the development of gas production and the development of all other sectors, particularly sectors requiring gas as a raw material or as a heat source and sectors connected with new apartment construction. Many new industrial plants and hundreds of thousands of apartments will depend in due course on the supply of gas. If gas is not available on time, these new plants cannot start operating, and the resulting damage inflicted to our national economy would be incalculable. We cannot afford any slip-ups in our investment construction in either the production or the distribution system.

Our tasks are great and difficult, but there is no question about fulfilling them. The responsibility for their solution must therefore not rest in the hands of a closed circle of economists; it must become the concern of all workers in our enterprises who will be called upon to participate in drafting the Third Five-Year Plan and in solving the problems arising during the drafting stage.

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CZECHOSLOVAKIA

National Conference on Automation of Inter-  
City Telephone Operation

[The following is a translation of an article entitled "Celostatni Konference o Automatizaci Mezimestskeho Telefonniho Provozu" by Otakar Klika, published in Slaboproudny Obzor, No 3, March 1960, Prague, pages 185-186; CSO: 4008-N]

On 9 to 12 December 1959 the Czechoslovak Technical Science Society (Cs. vedeckotechnicka spolecnost), Section for Electrical Engineering, held a national conference on automation of inter-city telephone operation at Gottwaldov. The conference was sponsored by the branch of the Cs. VTS [Czechoslovak Technical Science Society] attached to the Kraj Department of Communications at Gottwaldov. The technical level of the conference was high, the atmosphere at the Hotel Moskva was pleasant; it was attended by more than 300 specialists of the communications sector and by many delegates representing transportation, the Ministry of National Defense, the Ministry of the Interior, universities, and the telecommunications industry.

Conferences dealing with problems of automating telephone operations have always had a good record. The first conference of this kind was held in 1958 at Karlovy Vary as part of the low-voltage ESC [presumably, Czechoslovak Electrical Engineering Association] convention; the groundwork for the Czechoslovak automation plan was laid there, although since then it has been changed several times. In 1956 the VTS sponsored a conference in Prague at which discussions were held on problems concerning lower level components of the national communications network. The present conference at Gottwaldov was the third, and its activities were concentrated on the following aims:

- a) informing all workers concerned about the approach of the Ministry of Communications to the problem of automation of inter-city telephone operations;
- b) familiarizing these workers with the scope of automation;
- c) promoting the exchange of ideas on the problems raised and securing constructive suggestions and recommendations.

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The following lectures on basic issues were delivered at the conference:

The Importance of Automating the Telephone System in Czechoslovakia, by Vojtech Kocarek, VUS [not identified], Prague  
Draft of the Automatic Telephone System, by Josef Hamrik, Spojprojekt, Prague  
The Problem of Transmission in the Automatic Telephone System, by Frantisek Vodicka, Spojprojekt, Prague  
Draft of Higher Level Communication Networks and of the International Communication Network, by Vojtech Kocarek, VUS, Prague

Additional lectures followed on:

The Solution of Automatically Controlled Central Exchanges, by Emil Poupa, Ministry of Communications, Prague  
Technical Facilities for Automatic Control of the Telephone System (Communication Technique), by Adolf Petr, Ministry of Communications, Prague  
Technical Facilities for Routing Techniques, by Frantisek Vodicka, Spojprojekt, Prague  
Technical Facilities for the Construction of Communication Lines, by Adolf Karbula, Ministry of Communications, Prague  
Technical Changes Resulting from the Automation of Inter-City Telephone Operation, by Emil Poupa, Ministry of Communications, Prague  
Experience with the Operation of Automatic Telephone Networks, lectures by maintenance workers of KRSS [not identified] at Zilina and Usti nad Labem

The delegates were briefed on tasks concerning the "automation of inter-city telephone operation;" the task written into the "directives of the Party Central Committee and the Government for the Third Five-Year Plan for developing the national economy in 1961-1965." The task calls for the elimination of the disproportion existing between the slow rate of progress of our communications system and the general favorable development of our economy. The task also emphasizes the necessity of raising the living and cultural standards of our workers.

The program of the conference envisaged the aims of the Third Five-Year Plan as well as our long-range goals. The construction of an automatic inter-city telephone system is a huge task, and it will have to be fulfilled in several stages. We visualize the following essential stages:

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- 1) continuation of the automation of local networks and intensification of efforts toward establishing automatic central exchanges (new term for the former okres exchanges);
- 2) introduction of automatic long-distance dialing between large cities (i.e., including automatic recording of rates for inter-city calls);
- 3) automation of high-level networks.

These stages do not have to follow consecutively; they may also proceed on a parallel schedule for the entire national territory. This leaves enough room for flexibility and eases the pressure of solving incidental automation problems (e.g., new buildings) that at the moment may not appear to be profitable investments.

The over-all construction will take three five-year plan periods to complete--in other words until 1975. The structural changes of inter-city operations will then present the following picture:

	<u>Today</u>	<u>By 1975</u>
1. Manual operation	90 percent	10 percent
2. Semi-automatic operation	minimal	20 percent
3. Automatic operation	fraction	70 percent

The central exchanges will be 90 percent automatic and 10 percent semi-automatic. In conjunction with this structure

- a) the volume of inter-city communications will be four times as high as in 1958; and
- b) the number of telephone sets will rise to 16 percent (i.e., 16 sets per 100 people).

The above essential data reveal the all-out character of the new construction. The existing communications and transmission technique is barely adequate for the automation of local and central exchange operations, but it does not have the potential required to meet the needs for the automation of long-distance inter-city operations. The only solution is to build new facilities that will ensure:

- 1) promptness in completing calls without any waiting time;
- 2) maximum operational reliability;
- 3) unmodulated power of transmission on any distance;
- 4) maximum economy of investment.

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The new facilities are not yet the product of a clear-cut system, because there always remains the question of whether the changing development of techniques will ever reach a final settled stage. As of today, we are thinking quite seriously of replacing the dialing system with crossed hookups; we hereby intend to point in a general way to a basic hook-up element without mentioning anything about the possible future development of such a new system toward decentralized or centralized control with either electromechanical or electronic devices. We have not yet heard the last word on matters concerning the technique and economy of transmission. We know for sure that high-frequency telephony will not be limited to long distance inter-city communications but will make inroads into short routings that connect central exchanges. The same applies to communications on very short waves. The use of high-frequency systems in lower level communication components affects the conventional distribution of the sound reduction; however, that may be revised and lead to further savings in local and central exchanges.

The inter-city telephone system was originally drafted and recommended in 1954 as part of the future plan for the development of communications. The recommendation was based on the then prevailing political and economical conditions; the inter-city operation had to be automatic up to the level of transit communication; all other inter-city operation (on long-distance) had to be semi-automatic, with one operator making the connection.

There has been a forceful development of the telephone operation and telecommunication technique; the communication authorities of all socialist countries therefore decided on a uniform modern automatic communication system for local and inter-city operations. These were the factors that led to the revision of the originally conceived plans for the future and to a new approach to the solution of the communications system on the basis automatic operation.

With respect to numbering, it was decided that central exchanges should be numbered by concealed routing identification marks. This decision was supported by the comparatively low capacity of the majority of local exchanges of which the central exchanges are constituted; they will take over most of the operations. On the other hand, the higher level exchanges will use open routing identification. A plan for a uniform numbering of telephone exchanges was also adopted.



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The conference convened at a time when preparations for the reorganization of the public administration and of the national economic control were going on. Everyone was therefore concerned about the effect that the reorganization might have on the proposed solution of the telephone system. There is no reason why the basic and specific drafts for the inter-city communication structure should be affected by the new administrative provisions. Certain modifications will be in order in connection with the establishment of new economic regions that would influence the vital interests of communities and towns. These cases will be dealt with separately.

During the conference, the delegates were reminded more than once about the importance of problems other than technical, in particular the problem of engineering cadres; their shortage is felt especially in the communications sector. The new technique is comparatively complicated because of the interplay of communication and transmission problems. This calls for a higher qualification on the part of technical workers engaged in drafting projects, in construction, operation, and the maintenance of technical facilities.

The part of the conference dedicated to debating was rather subdued at the beginning--which is quite common--but it gained momentum, judging from the 67 contributions to the debate. The discussion centered around specific incidental problems rather than the main topics of the lectures. All the entries were very interesting and were contributed not only by the older set of workers but by the younger and even the youngest generation.

All lectures and important contributions to the debate will be printed in a collection to be published by the Czechoslovak Technical Science Society. In addition to that, our publication will print summaries of the principal lectures, and we therefore refrain from commenting here on their merits.

The resolutions adopted by the conference reflect the subjects of the principal lectures as well as some other interesting points. We refer to the work that is being completed on the draft of the national communications system in accordance with results obtained from operational research and in cooperation with the industry. The operational research will be decentralized, and laboratories will be set up and properly outfitted in important centers of telecommunications under the methodical supervision of the Research Institute for Communications (Vyzkumny ustav spoju).

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The question of cadres attracted considerable interest. The demand was voiced for an adequate number of qualified mechanics and technical and engineering cadres, who should be assured of reward and social standing commensurate with their qualifications and responsibilities. The growth of qualified communication cadres will be ensured as follows:

- a) Newly admitted engineering and technical cadres will be trained in centrally organized specialized trade courses.
- b) On every new item of technical development that is added to the communications system, special courses will be organized for the benefit of the technical personnel in order to acquaint them with proper maintenance, operation, and method of measurement.
- c) All new facilities will be described in a detailed specification list and will be accompanied by instructions for maintenance, operation, and method of measurement in order to enable the staff to improve its qualifications and to properly maintain the equipment. The conference emphasized the importance of developing technical norms, specifications, and terminology of communications.

In summing up, we may say that the conference was a strenuous affair. A survey of "public opinion" made through questionnaires (which did not have to be signed) revealed that, without exception, all delegates welcomed the idea of this conference and they favored its early continuation. A great contribution to the success was the very pleasant atmosphere of the conference created by its sponsor, who received a well deserved commendation. One of the major merits of the conference was the acceptance of the idea of establishing technical science societies.

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CZECHOSLOVAKIA

Outlook for Regional Distribution  
of Livestock Production

[The following is a translation of an article entitled "Perspektiva Rajonizace Zivocisne Vyroby Podle Vyrobnich Typu" by Engr Josef Pytel, published in Nas chov, No 6, 16 March 1960, Prague, pages 151-152; CSO: 4162-N/a]

In the future, our planned economy is expected to distribute its production tasks according to the natural and new economic conditions in order to utilize fully its productive forces and means. The zones of the agricultural production are based on four basic production areas: corn, sugar beet, potato, and mountainous. The division is adequate from the point of view of livestock production. The potato types are further divided into higher and lower subtypes.

Specialization in livestock production is based on the types of fodder crops which secure the highest yields of nutrients in the individual production types (i.e., proteins and oat units), on the given economic conditions (suburban areas, etc.), the possibility of getting certain types of feed (wastes of the food, starch, etc. industries), and the possibility of utilizing the available productive capacity. The production specialization should also meet the biological requirements of the individual species of livestock within the regional distribution of livestock production. Table 1 indicates the average per hectare yields of fodder crops to be achieved in the individual areas in order to fulfill the planned volume and planned production.

Table 1

Yields of Fodder Crops per Hectare of Arable Land  
in 1965 Needed to Reach the Planned Number of  
Livestock and Planned Livestock Production

Crop	Production Type			
	Corn	Sugar Beet	Pota- to	Moun- tain- ous
Alfalfa, hay	60.5	76	62	-
Clover, hay	40	40	59	54
Alfalfa grass, hay	65	80	65	-
Clover grass, hay	60	75	63	65
Temporary meadows, hay	50	70	60	60
Permanent meadows, hay	40	55	52	35
Silage corn	370	450	420	-
Winter mixed crops	200	200	200	150

The following distribution of the livestock production is characteristic of the individual production types according to the past experiences:

#### Corn Production Type

Owing to the scarcity of soil moisture, this area guarantees the highest and safest yields of fodder crops which use fall and winter precipitation and are drought-resistant. The corn type has few meadows, and most of the fodder is produced on arable land. The chief crops are corn, grown both for grain and silage, and winter and spring mixed crops. Alfalfa is grown less than in the sugar beet areas. Fodder sugar beets and fodder beets are also grown here.

The relatively low volume of crops rich in proteins, and the predominance of crops of the carbohydrate nature, which, in the corn production type, render higher and safer yields, create good conditions for the production of meat and milk. Suitable for this area is cattle raised for combined slaughter and dairy purposes. However, even in the future the intensity of cattle raising will be lower here than in the sugar beet production type.

The larger production of feed grain facilitates a development of the breeding and fattening of hogs and poultry, whose density and productivity per hectare of agricultural

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land is higher in this production type than in the others (Table 2).

Table 2

Indices of the Meat, Milk, and Egg Production as Compared with the Sugar Beet Production Type (equals 100), Derived from the Planned Production of the Individual Products per Hectare of Agricultural Land in the Third Five-Year Plan

Livestock	Production Type			
	Corn	Sugar Beet	Pota-to	Moun-tain-ous
Cattle--meat	73.9	100	68.2	62.7
milk	76.5	100	77.5	76.0
Hogs--meat	112.3	100	69.0	24.0
Poultry--meat	120.0	100	67.0	21.0
eggs	120.0	100	67.0	23.5

Sugar Beet Production Type

The production of the individual types of fodder crops is basically the same as in the corn production type, but their ratio is different.

The higher precipitation volume and the more favorable climate makes this area suitable for legume-cereal mixtures and fodder cabbage. Silage corn and crops for fresh feeding have high yields. But the characteristic crop of this area is alfalfa, which has the highest protein yield. Besides this, a substantial part of the fodder base consists of sugar beet tops and cuttings. The necessary carbohydrates are supplied by mixed crops and corn.

Compared with the corn type, the sugar beet type produces more nutrients per hectare; this is also helped by the larger ratio of fodder crops grown and the higher per hectare yields. The acreage of permanent meadows and pastures is small, but it is larger than in the corn type.

The above-mentioned fodder base of this type makes it suitable for the most intensive development of the milk and beef production, and for a relatively intensive raising of hogs and poultry. Therefore, this type has the most intensive livestock production.

### Potato Production Type

This type has the most variegated fodder base as far as the types of crops are concerned. This is due to the large volume of precipitation.

The lower potato production subtype has production conditions similar to those of the sugar beet type, while the higher subtype is closer to the mountainous type.

The characteristic fodder crops are clover and meadow grass for fresh feeding, as well as hay. The carbohydrate requirement is covered by corn and winter mixed crops for fresh feeding and ensilaging.

The potato production type has a balanced feedstuff production. Plentiful meadows and pastures are ideal nutrition sources for young cattle. The climatic and soil conditions also fulfill the biological requirements for a healthy development of young animals. In the future, this area will dairy cattle--mainly those with a good ability to utilize the farm fodder crops. Thus the milk production, which is low today as compared with the corn production type, will rise. The high potato yields constitute a good basis for breeding, raising, and fattening of hogs as a complementary production of the cattle raising. Poultry farming is less intensive here.

### Mountainous Production Type

The mountainous type consists predominantly of meadows and pastures which offer enough good quality grazing during the summer feeding season. Grazing may be suitably supplemented by carbohydrate silage from winter mixed crops. The intensity of cattle raising is approximately the same as in the potato production type, but hog fattening and poultry raising serve mostly local purposes. The good quality of cattle in the potato and mountainous areas (milk type, modest, utilizing well the farm fodder crops) creates good conditions for breeding and a large number of heifers for supplying the herds in the sugar beet and corn production types.

The regional distribution of the livestock production is based on the types of fodder crops in the individual production types; the number of types in each area is fixed and

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should maintain the highest economically suitable yields of nutrients (digestible proteins and oat units).

The degree of concentration of a specific species of animals with the same degree of utility (i.e., specialization) is determined by both the types and intensity of the fodder crops grown, as well as by their suitability as fodder for specific species of animals.

Most important are the fodder crops grown on arable land. Table 3 illustrates their distribution on arable land in 1965 according to the individual production types and indicates the percentage of their individual types. The potato production type will be decisive for a further substantial rise in livestock production, particularly for more cattle and its higher utility; this production type represents roughly 50 percent of the total agricultural land in the Czechoslovak Republic (Table 4). The relatively low yields of fodder crops may be improved without costly investment through correct application of agricultural technology and fertilization.

Table 3

Percentage of Fodder Crops on Arable Land According to Area; Percentage of Land Sown in the Various Fodder Crops in 1965

Crop	Production Type			
	Corn	Sugar Beet	Potato	Mountainous
Crops on Arable Land				
Total	27.8	26.9	28.6	33.0
Percentage of individual types				
Perennial fodder crops, total	78.8	70.6	63.3	60.5
Winter mixtures as main crop	-	-	-	9.2
Spring mixed crops	4.7	5.3	5.2	4.5
Silage corn	8.0	12.6	11.4	-
Fodder cabbage	1.5	2.8	4.5	10.3
Fodder sugar beet	1.9	3.5	4.5	-
Fodder sugar beets, carrots, turnips	3.8	5.0	3.5	10.3

[table continued]

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[Table 3 continued]

**Intermediary Crops\***

Winter mixed crops	26.8	12.6	11.4
Stubblefield mixed crops	13.4	21.6	13.5

\*Intermediate crops indicate the percentage of the acreage of fodder crops on arable land. They are not included in the acreage of arable land.

**Table 4**

Ratio of Acreage of Arable Land in Individual Production Types and Ratio of the Number of Livestock (Number of the Individual Species is Given in Indices; Number of Livestock in the Sugar Beet Production Type per Hectare of Agricultural Land = 100, as Determined by the Third Five-Year Plan)

	Production Type			
	Corn	Sugar Beet	Potatoes	Mountainous
Agricultural land, percent of the total land in Czechoslovakia	15.5	26	49.4	10.4
Cattle	81.2	100	78.1	85.7
Hogs	112.3	100	69.0	24.0
Poultry	128.5	100	22.0	24.5

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CZECHOSLOVAKIA

Ultimate Distribution of Breeds of Cattle in  
Czechoslovakia. Contribution to the  
Discussion on Cattle Types and Their Utility

[The following is a translation of an article entitled "Upraveny Chovny cil Plemen Skotu v CSR. K Diskusi o Typu Skotu a Jeho Hospodarnosti" by Engr Bohumil Suchanek, published in Nas chov, No 6, 16 March 1950, Prague, pages 153-155; CSO: 4162-N/b]

All work, to be successful, must have a goal; this applies also to the breeding of livestock. Every type of zootechnical work must have a clear ultimate breeding goal. To attain this, we have to focus all zootechnical and breeding measures on the goal. When we started to develop large-scale cattle raising, it became necessary to set the goal and the breeding standards to correspond to the present zootechnical requirements and changed economic conditions. This article is intended to inform the reader on the newly adjusted cattle breeding goal in Czechoslovakia, which will also serve as a basis for our discussion of cattle types and utility.

The breeding goal determines the breeds, strains, and type of cattle which will be raised in the Czech krajs and in Slovakia. It takes into account the conditions in the individual production areas.

**Distribution of the Breeds and Strains**

Czech krajs will raise Red Spotted Cattle: a) heavy type, medium frame; b) lighter type, medium to small frame.

The heavier type will be externally almost identical with the present Red Spotted Cattle and will be raised in the lowland areas of the intensive farming--i.e., in the areas of corn and sugar beet types and the potato B<sub>1</sub> subtype.

The local cattle raised in a determined breeding area (mountainous production area, potato-oats area, and potato B<sub>2</sub>

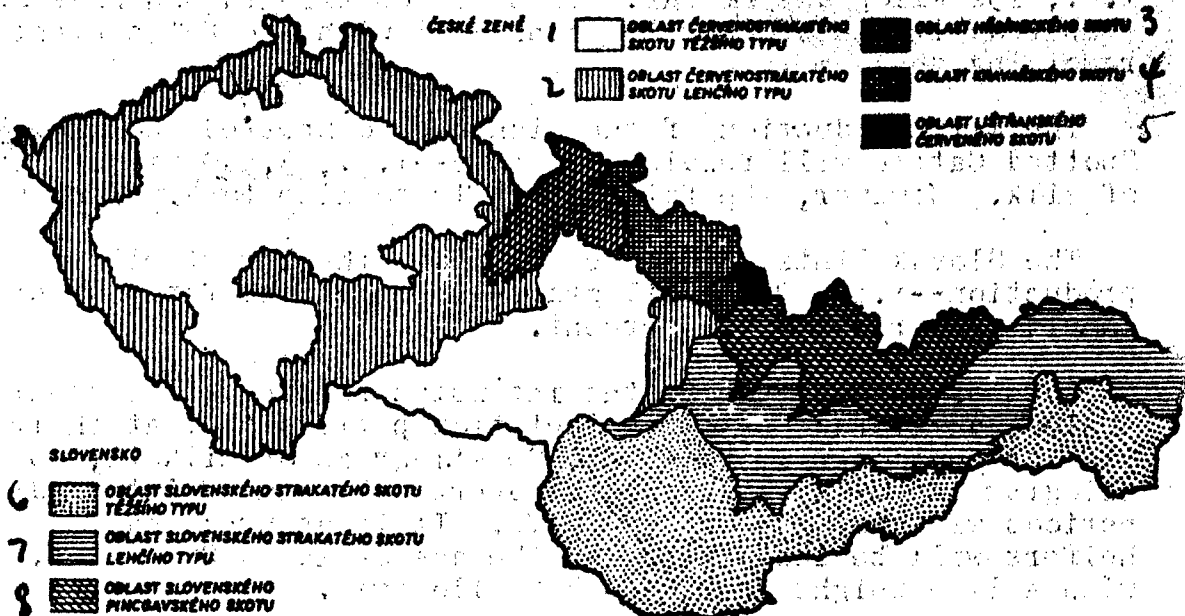
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subtype) and the Hrbinecky and Ayrshiresky Cattle will serve as material for the breeding of the lighter cattle type. The two latter strains were selected for their very well developed milk producing characteristics; they have a smaller frame, a lower live weight, and are well adjusted to the sub-mountainous areas. At the present time, they will be bred separately, but still with the breeding goal of being able to create, with the local cattle (for instance, in the area below the Krkonose Mountains), a uniform lighter type of the Red Spotted Cattle. Ayrshire bulls will be used for cross-breeding to produce lighter cattle types, as is being successfully done now in the area of the Orlické hory Mountains; tests will also be made in cross-breeding with the Swedish Red Spotted breed. It is assumed that the area of the lighter cattle type will comprise about 36 percent of the agricultural land in the Czech krajcs and the area of the heavier type about 64 percent.

The following breeds will be raised in Slovakia: a) The Slovak Spotted Cattle of the heavier type in the southern areas of intensive farming; b) Slovak Spotted Cattle of the lighter type in the central area, and the potato area; c) Slovak Pintzgau Cattle in the northern mountain areas. It is assumed that the Slovak Spotted Cattle will expand with the gradual intensification of farming, particularly with the improvement of the fodder base, and the Pintzgau Cattle will be kept in the future only in the most extensive and rough natural conditions. In 1975, the percentage of the individual breeds in Slovakia should be as follows: Slovak Spotted Cattle of the heavier type, 55 percent; lighter type, 35 percent; Pintzgau Cattle, 10 percent. The enclosed map indicates the distribution of the cattle breeds in 1975 as it will be regulated through an ordinance of the Ministry of Agriculture (Ministerstvo zemědělství).

### The Ultimate Breeds and Strains

Good milk production and slaughter utility are the two most important requirements for all breeds and strains raised in Czechoslovakia. The milk-production requirements are identical in the heavier and the lighter types of the Czech Red Spotted Cattle and the Slovak Spotted Cattle. The reason is that they are in the same production types in the Czech krajcs and in Slovakia. Both heavier types, the Czech Red Spotted and the Slovak Spotted Cattle, are to achieve, in the third and higher lactation standards (300 lactation



Map of the Distribution of the Individual Breeds, Strains, and Types of Cattle Raised in Czechoslovakia

Czech areas

- 1) Red Spotted Cattle, heavy type
- 2) Red Spotted Cattle, light type
- 3) Hribenecký Cattle
- 4) Kravarský Cattle
- 5) Listnanský Red Cattle

Slovakia

- 6) Slovak Spotted Cattle, heavy type
- 7) Slovak Spotted Cattle, light type
- 8) Slovak Pintzgau Cattle

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days), 3,800 kilograms of milk with 4 percent fat content--i.e., 152 kilograms of fat. This is 300 kilograms higher as compared with the former breeding goal with the fat content remaining the same.

The milk production of the lighter Red Spotted and Slovak Spotted Cattle will remain as before--i.e., 3,500 kilograms of milk. However, the fat content is to rise to 4.1 percent.

The Slovak Pintzgau Cattle will have the lowest milk production--i.e., 2,700 kilograms--in which the fat content should also rise to 4.1 percent.

Cows of both breeds in the intensive farming areas should achieve an average of seven lactation periods to that their life production will reach 25,000 kilograms of milk (1,000 kilograms of milk fat), and the average length of intermediate periods will not surpass 400 days. It is assumed that heifers will be inseminated at the age of 18 to 20 months, with a live weight of 400 to 420 kilograms.

The lighter types of the Red Spotted and Slovak Spotted Cattle are expected to be healthier owing to the effect of the summer grazing and the consumption of more hay and less by-products of the food industry during the winter period. Therefore, it is expected that their life production of milk will also be 25,000 kilograms of milk (1,000 kilograms of butter fat); however, this amount will be produced during eight lactation periods, with the average length of the intermediate periods not surpassing 390 days. Heifers should be inseminated at 19 to 20 months, weighing 370 to 400 kilograms because of their slower growth.

The Slovak Pintzgau breed is supposed to yield 20,000 kilograms of milk (820 kilograms of milk fat) during eight lactation periods with the intermediate period averaging not more than 390 days. Heifers will be inseminated at 20 to 23 months, and a weight of 350 to 370 kilograms.

In connection with the life utility of cows, it has to be noted that the seven or eight lactation periods are considered the average for breeding cows. Of course, efforts will be made to lengthen the life of the best milch cows because their longer life will not only give good milk yields but produce as many descendants as possible.



An outstanding breeding bull of the Red Spotted Cattle of the heavy type: Amor H 6362-50, nine years old, 149 centimeters high, 55.7 percent chest depth, 1,100 kilograms. Mother: second to sixth lactation periods--3,593 kilograms on the average, 3.99 percent butterfat, 143.5 kilograms; maximum fifth lactation period--4,676 kilograms, 4.17 percent [butterfat], 195 kilograms. Mother of the sire: first lactation period--4,742 kilograms, 4.27 percent [butterfat], 202.5 kilograms. Now at SP3 [presumably Statni plemenarska stanice; State Breeding Station] in Grygov near Olomouc. Photo by Engr Suchanek.



A typical representative of the lighter type of Red Spotted Cattle: Junek Sp 4402-51, seven years old, large chest depth, voluminous trunk and long body. Mother: first to eighth lactation periods--average of 3,575 kilograms, 4.09 percent [butterfat], 224.1 kilograms. Raised at the Research Institute (Vyzkumny ustav) in Rapotin; now at Research Station (Vyzkumny stanice) in Vlcice near Trutnov.

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Red Spotted Cow PHWB 406/L848, eight years old, 136 centimeters high, 53 percent chest depth, 670 kilograms. Utility: maximum sixth lactation period--5,079 kilograms, 4.07 percent [butterfat], 206.6 kilograms. Owner: JZD [Unified Agricultural Cooperative] in Topolna, Uherske Hradiste Okres.



Hrbinecka cow O0BB 133, nine years old, 129 centimeters in height, 52.5 percent chest depth, 520 kilograms. Utility: maximum fourth lactation period--3,864 kilograms, 3.94 percent [butterfat], 152.2 kilograms. Owner: State Farm at Stare Mesto pod Sneznikem, Stribrnice Farm.

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## Standards of the Breeds and Strains

The exterior appearance of the cows should be the so-called economical type characterized by a medium frame, greater depth of chest and loins, sufficient length of the body, and voluminous trunk. Animals should possess the ability to use the feed in an economical way, particularly farm-produced feed and pasture, for the production of milk and meat, and should react quickly to improved conditions in their environment.

Compared with the former breeding standards, the body frame of the animals should be lower. Thus, the height of the Red Spotted Cattle of the heavier type should be lowered from 135 to 142 centimeters to 131 to 139 centimeters (135 centimeters average); the lighter type from 128 to 135 centimeters to 127 to 134 centimeters (131 centimeters average). The depth of the chest should increase from the former 51 percent of the height to 52 to 53 percent. A similar reduction of the frame and an increase in the chest depth should be achieved in bulls of the Red Spotted Cattle and both Slovak breeds.

## Exterior Appearance of the Individual Cattle Breeds

Breed	Height in Centimeters		Chest Depth Per-cent	Live Weight in Kilograms	
	Average	Range		Average	Range
Red Spotted, heavier type:					
a) cows	135	131-139	52	620	570-670
b) bulls	145	141-150	55	1,000	950-1,100
Red Spotted, lighter type:					
a) cows	131	127-123	53	550	500-600
b) bulls	142	138-145	55	900	850-950
Slovak Spotted, heavier type:					
a) cows	136	132-140	52	620	570-700
b) bulls	146	142-150	54	1,000	950-1,100
Slovak Spotted, lighter type:					
a) cows	132	128-135	53	560	520-600
b) bulls	143	139-146	55	900	850-950
Pintzgau: a) cows	127	122-132	52	520	425-600
b) bulls	136	132-141	55	800	700-900

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Animals with a large frame and insufficient chest and loin depth are not suitable for breeding.

The body structure should be strong, harmonious, and "noble," with well developed parts indicating a good milk production ability. Good walking ability is required in both lighter types and particularly the Slovak Pintzgau breed.

Our efforts should be concentrated especially on the improvement of height and volume, enlargement and improvement of the form of the pelvis, and improvement in shape and position of the udder. These are the characteristics of the milch cattle type; their development should be balanced as the development of other utility characteristics.

The color of the individual breeds remains the same as before. A uniform color is useful in identifying a breed. Although our breeds are supposed to have, for instance, white heads (except for the Pintzgau breed), color marks (around eyes), should not be regarded as a deteriorating factor, particularly in animals otherwise meeting the breeding requirements. Unsuitable for breeding are animals with substantially depigmentized hair, with a predominance of white color, too light color, and animals which bear evidence of cross-breeding with other breeds.

In concluding this article, we would like to say that the ultimate aim of breeding should be to develop the utility characteristics of the whole breed. Controlled breeding herds, particularly on the breeding and cattle-raising farms, should be better than the other herds, and they should attain the planned goal in the near future.

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CZECHOSLOVAKIA

Development of Automation in the Czechoslovak  
Electric Power System

[The following is a translation of an article entitled "Rozvoj Automatizace be Ceskoslovenske Energetice" by Jan Rada, published in Automatizace, No 4, 1960, pages 97-97; CSO: 4199-N]

If we look back at the past fifteen years in the development of the Czechoslovak electric power industry, we may say that we have achieved good results despite all the difficulties, thanks to the enthusiastic efforts of all workers in the electric power industry and other branches, motivated by a desire for the rapid development of socialism in our country.

The tremendous growth of our economy during the time of the Two-Year Plan and both Five-Year Plans was accompanied by a large expansion of our electric power industry. We have built a number of large modern steam and hydraulic electric power plants, and the total capacity of the Czechoslovak electric power system has increased several times as compared with the situation in the capitalist republic. The expansion of our nationalized power plants has not always been smooth, and there have been shortcomings resulting from tasks for which we were not always prepared. Until recently, the main task of the power industry was the leveling off of the output differences and the smooth supply of electric power. Therefore, the principal attention was concentrated on accelerating the construction of new plants and distribution networks as well as on the utilization of the available electric power resources; less attention has been paid to the improvement of the technical level.

Despite some difficulties, the electric power industry has expanded rapidly during the recent years. Before the war a large part of the electric-power equipment had to be imported; today, our engineering industry manufactures complete modern equipment for our new power plants and the power distribution network. The development of the production and distribution technology has been accompanied by a gradual improvement in the general production standards, so that we have been able to achieve a substantial reduction in the number of workers

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per unit of installed capacity and in specific fuel consumption per kilowatt hour supplied during recent years. We have succeeded in doing this by installing aggregates with a higher capacity and systematically applying modern technological methods, particularly through mechanization and automation.

The foremost requirement of electric power production is reliability of production and supply as well as the maintenance of the prescribed parameters; naturally, this could have been achieved only by applying large-scale mechanization and various types of automation installations. Thus, the electric power industry moved to a leading position in our industry as far as mechanization and automation is concerned.

Planned automation of our electric power plants, especially steam and electric power plants, began only in 1954.

The mechanization and automation level reached in the electric power industry may be characterized by the level achieved in the following most important fields: more than 80 percent of the installed capacity of the aggregates in the hydraulic power plants are equipped with automatic devices controlling breakdowns, and 61 percent of the total capacity is fully automated. The steam electric power plants are highly mechanized, with 90 percent of the total installed capacity mechanized in full. All high-output boilers and most of the medium-output boilers are equipped with automatic regulation of combustion, and these represent 60 percent of the total number of boilers. The feeding of boilers is 92 percent automatic. The steam electric power plants have 22 automatic coal-sorting installations. All electrical installations in the power plants are equipped with automatic safety devices and regulators and the larger generators have automatic phase equipment. The newly completed power plants are equipped with automatic regulation of auxiliary installations and automatic starting of the reserve equipment.

The distribution system is 100-percent equipped with automatic relay safety devices, and 23 switch houses are remotely controlled. More than 50 percent of the outlets are equipped with economically efficient installations for automatic repeated switching in.

The amount of automation in our electric power industry is large and, on the average, reaches the world level; however, we cannot regard the present tempo of automation and its application as satisfactory.

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-It will be necessary to interest a much larger number of workers in the electric power industry and other branches in these problems in order to expand the further automation of the plants. The ORGREZ [not identified] National Enterprise has helped effectively in automating and installing automatic equipment in the electric power plants; it developed a successful design for electronic automatic regulators, which proved to be successful under operational conditions. However, the decisive factor in the expansion of automation is the personnel of the plants: we suffer a great shortage of experts in automation technology. This shortcoming must be eliminated as soon as possible by systematic training of specialized groups of workers.

We have to admit that the electric power industry has not utilized all the possibilities of automation, for which there are, on the whole, very favorable conditions in the continuous process of electric power production. Actually, only some sections of the process have been automated, and in some instances, we have not achieved the best results. Therefore, automation has not had much effect on labor productivity. Therefore, it will be necessary to transform the automation of the key sections into a complex automation and to achieve through this process a real economic effect. In that way we may establish a basis for the next stage, the automation of our entire electric power system.

The electric power industry built pilot plant units for the purpose of acquiring experience with the application of new equipment and its economic effect on the basis of maximum mechanization and automation. The Electric Power Research Institute (Výzkumny ústav energetický) proposed a pilot automation of the thermal electric power plant in Porici, remote control of the hydroelectric power plant in Nosice and Skalka, and remote control of the switch house in Pelhrimov.

The electric power plant in Porici will complete its equipment and automatic devices and will build a central control room; individual aggregates will be started by means of a panel switchboard in the present thermal control room. The proposal is designed to preserve as much as possible of the available automatic devices and solve the problem by achieving the maximum economic effect through the saving of manpower, electric power, and fuel. It is hoped that 45 workers will be eliminated and approximately 400,000 koruny will be saved in this way. It is assumed that the project will be amortized within six years.

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A remote control of the currently used automation equipment will be studied in the Nosice Hydroelectric Plant.

The proposed remote control of the 110/22 kilovolt switch house in Pelhrimov is related to the new design of switch and houses based on the higher effectiveness of the investment construction plan. The new design features a simplified diagram of the 110-kilovolt switch unit, and the use of only disconnecting switches and an outdoor 22-kilovolt switch. The use of remote control in this case will radically reduce the number of personnel. All three ventures will be completed by the end of 1962. The electric power industry has turned its attention lately to the possibility of applying a higher degree of automation by means of calculation equipment. The new power plants which are almost 100-percent mechanized and have a high degree of automation have rather favorable conditions for the application of data-processing machines.

These tasks cannot be fulfilled in the future by applying the present automation equipment; it will be necessary to solve the problem by applying the most advanced data-processing machines.

None of our industrial branches uses automatic calculating machines for the automatic control of technological processes, and these machines have not been sufficiently developed for that purpose.

In order to acquire practical experience with the application and development of data-processing machines, we designed two types of prototype equipment to be installed in two of the most modern thermal electric power plants. The experience which will be acquired will be applied not only in the electric power industry but also in other industrial branches. One is a measuring unit which will be installed in the Porici II Electric Power Plant at the end of 1961. It is a digital instrument for the automatic control of the operational parameters, with a possibility of automatically evaluating the course and economic performance of the production process in cooperation with a punch card device. The measuring unit will be manufactured by the electric power industry and will use mostly elements which already exist.

The proposed measuring unit should be regarded as the first stage in the centralization of the measured quantities, with a simultaneous possibility of making simple calculations and corrections through the existing regulating elements with

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which our basic electric power installations are equipped; the unit will be used mainly in those plants where it would be uneconomical to go over to a complex automation based on automatic control and regulatory calculating machines.

The unit which will soon be put into operation in the Porici II power plant will be the first application of the calculating machine in the production process in Czechoslovakia.

The second unit will be an automatic calculating machine designed for operational purposes. It will be a controlling and regulating calculating machine, which is part of the basic research in the field of automation. The Institute of Information Theory and Automation (Ustav teorie informace a automatizace) of the Czechoslovak Academy of Sciences (Ceskoslovenska akademie ved) offered to build a prototype of this calculating machine for our electric power industry. The prototype will be installed in the Opatovice electric power plant with suitable conditions from the point of view of management and personnel. It is scheduled to start operating at the end of 1963.

The concept of the automatic calculating machine as designed in the Institute of Information Theory and Automation is intended to take over all the functions of the present available measuring and regulating equipment and control--i.e., it is assumed that the unit will take over the centralization of data on the course of operations, their reduction, signaling of breakdowns, and automatic regulation. Also under consideration is the automatic distribution of the load to the individual generating blocks and automatic starting and stopping of the generating equipment.

The Opatovice Power Plant will use the prototype of the automatic calculating machine for the control and automatic regulation of one generating block, and will equip other blocks with the same machines if the test proves successful; one of the units would automatically distribute the load to the individual blocks.

The unit now being developed for the Opatovice plant may be applied in other electric power plants with actually no alterations, particularly in the new plants. These local calculating machines would be connected to a central dispatching unit in the future.

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The quantitative changes which are taking place in the Czechoslovak electric power industry will require a more elaborate method of controlling the whole dispatching system. The rather complex problem of automating the central control of the entire electric power system awaits the solution of a number of theoretical problems and the development of some types of instruments and equipment. There are many problems awaiting the present future automation of the electric power industry, and it is imperative that the Electric Power Research Institute study them seriously and in time.

The widest possible application of automation in the electric power industry is one of the preconditions for a successful operation of the large new power plants and successful cooperation between the Czechoslovak electric power system and the systems of the neighboring states. Analyses of the above problems should be based on the over-all economic effects of introducing automation in the electric power industry; its final effect may be more evident in the national economy as a whole than in the electric power industry itself.

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CZECHOSLOVAKIA

New Wage System in the Ore Mines National  
Enterprise in Pribram

[The following is a translation of part of an article entitled "Nova Mzdova Soustava v n. p. Rudne Doly, Pribram" by Jaromir Poupa and Jiri Kolarik, published in Rudy, Vol VIII, No 3, March 1960, Prague, pages 76-78; CSO: 4182-N/a]

Table 1

Fulfillment of the Plan by Individual Mines

	P r o d u c t i o n U n i t s					
	Anna Mine	Voj- tech Mine	Febru- ary" Mine	Treat- ment Plant	Auxi- liary Units	Plant Total
Gross output:						
January	104.5	105.2	101.3	108.3	106.8	108.7
February	105.1	105.8	103.0	108.4	108.7	106.9
March	104.3	103.9	104.9	113.2	122.0	113.7
Labor productivity:						
January	104.0	101.8	100.9	113.9	107.3	108.7
February	104.6	103.5	101.6	112.8	108.3	106.3
March	105.3	102.1	104.2	115.4	119.8	113.2
Average earnings:						
January	99.7	99.4	98.5	103.3	100.9	101.1
February	99.7	101.8	102.9	103.6	103.3	103.0
March	100.6	100.0	102.2	108.1	105.7	103.3

Table 2

Fulfillment of the Efficiency Norms

	P e r i o d		
	First	Second	Third
<u>Stopping</u>			
Fulfillment of norms (%)	102.9	104.8	105.8
Output per shift: cm	55.3	59.1	58.5
m <sup>3</sup>	1.92	1.93	2.07

[table continued]

[Table 2 continued]

<u>Shafts:</u>			
Fulfillment of norms (%)	112.0	109.9	110.6
Output per shift: cm	28.2	26.2	26.0
m <sup>3</sup>	1.32	1.21	1.26
<u>Galleries:</u>			
Fulfillment of norms (%)	110.1	110.9	111.9
Output per shift: cm	41.1	40.6	40.5
m <sup>3</sup>	2.08	2.05	2.06
<u>Norm fulfillment (in %) of:</u>			
Other extraction work	105.7	104.2	114.7
All breakers	107.0	108.0	109.9
Total	119.8	119.2	116.7

All units of the base plant met all their planned targets in March as well as during the first quarter of the year. The highest fulfillment was achieved in March and it raised the level of wages in comparison not only with the preceding month but also with expectations. The individual units achieved the results presented in Table 1.

The data in the table show clearly that the fulfillment of the planned output and labor productivity was uniform in all months, with the exception of the auxiliary units, where the plan was 122 percent overfulfilled in March, and consequently the average earnings went up. The rate of growth of labor productivity and average earnings was also very good in individual units and throughout the plant in all the months. Only the "25 February" Mine had a setback in February, when its labor productivity was only 101.6 percent and average earnings 102.9 percent and its wage fund was overdrawn. The reasons were investigated and remedies were ordered, and the situation improved again in the following months. The disproportionate surpassing of the planned earnings in March was caused by some objective influences, particularly by the shipping of a larger volume of zinc concentrate. The continuance of the disproportionately high earnings of the plant as a whole is still affected by the high average earnings in the truck transportation division, where a reconstruction of the wage system is being prepared; after this is put into effect, even this division will fulfill its planned earnings in a more realistic manner, particularly by gradually reducing the number of overtime hours.

The fulfillment of the efficiency norms of the breakers in the stopes as well as the output growth have a rising trend.



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In March, the fulfillment of the norms rose 2.9 percent over January, while the output rose 8.0 percent per cubic meter and 5.7 percent per centimeter. The output was higher, while the width of the working sites in the stopes narrowed by 6.3 percent. The above results prove that workers understand their obligation to raise the quality of ore mining.

However, the more precise application of the efficiency norms and concentration on quality did not achieve the expected fulfillment of norms (109.1 percent).

Also, the plan for driving shafts (komin) was 7 percent higher than in 1958. The 1.4-percent smaller output in March 1959 as compared with January may be explained by the different amount of shaft driving in individual mines of the basin. The Anna Mine, unlike the Vojtech and "25 February" Mines, worked out a shaft-driving norm, including the timbering, and the results achieved proved that these norms were more advanced than those applied in the rest of the mines. Their efficiency is reflected in the per-capita and per-shift outputs in terms of all workers engaged in driving shafts, and by the economic results per linear meter of advance.

The output in galleries increased in March by 2.0 percent as compared with 1958. It dropped 1.5 percent as compared to January. The drop occurred in the Anna and Vojtech Mines. The result was affected by the higher ratio of work with larger profiles. The total fulfillment of the extraction norms approaches the expected level (111 percent).

The relatively high percentage of the fulfillment of all norms has been affected by the truck transportation division, where no wage reform took place (norms were fulfilled at 177.5 percent during the first quarter). This division affects the fulfillment of the efficiency norms of the plant by 7.0 percent--i.e., the total fulfillment of norms in units where wages have been adjusted was 111.6 percent during the first quarter.

The development of the average hourly earnings has been satisfactory on the whole, despite the fact that there were some upward and downward deviations in certain occupations. Table 3 indicates this development.

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Table 3

Wage Development

	Octo- ber	Norm	Janu- ary	Feb- ruary	March
Breaker [stoper]	13.76	13.21	12.29	12.33	12.68
Mine carpenter	8.75	9.16	9.00	9.12	9.27
Mine bricklayers and concrete-block masons	8.98	9.08	9.13	9.44	9.48
Mine transportation	8.40	8.49	8.36	8.45	8.38
Mine maintenance workers	7.66	8.08	8.00	8.24	8.36
Other mine workers	7.82	7.99	8.03	8.18	8.29
Machinist of the mine hoisting engine	8.27	9.10	9.22	9.43	9.47
Other surface workers	5.51	5.84	5.49	5.99	5.81
Mines, total	9.10	9.21	8.88	9.08	9.19
Ore treatment plant	6.40	6.48	6.50	6.76	7.12
Auxiliary units	6.91	6.84	6.81	6.81	6.92
Plant, total	8.20	8.26	8.08	8.19	8.33

We have to pay particular attention to the underfulfillment of the average hourly earnings of the breakers; the difference there is rather substantial. The lower figures have been caused by three main factors:

a) The fulfillment of the efficiency norms was lower than expected, as was mentioned above. A differences of two to three percent in the fulfillment causes the average earnings to drop by 20 to 27 halers per hour.

b) Lower fulfillment of the extraction plan in terms of metal (about 101 percent) as against the 103 percent in October 1958 also reduced the earning of breakers in stopes by four percent of the base schedule--i.e., about 38 halers per hour. Evidently, this reflects the stabilization of the extraction plan in relation to the planned labor-productivity growth.

c) A substantial number of hours were worked by breakers in other types of work than the ones for which norms have been set and who are paid on the basis of lower rates and lower bonuses.

The rising level of earnings indicates the real possibility of attaining the planned earnings. The planned wage

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level in other occupations was maintained or surpassed, particularly in March, when the wage level rose once more as compared with the previous months; it also affected the higher fulfillment of the output plan. Some workers, particularly the mine bricklayers, concrete-block masons, and other workers not enumerated surpassed the planned level of earnings in February and especially in March; therefore, it will be necessary to check the soundness of this development. On the whole, the level of earnings in mines approaches closely to the plan. Also, the average hourly earnings in auxiliary units correspond to the plan. The ore-treatment plant shows a relatively substantial rise, which, particularly in March, was affected by some objective factors, such as a higher number of overtime hours due to the large volume of shipped zinc concentrate, etc. But even here it will be necessary to check the wage development, particularly with regard to the rather large number of overtime hours worked during the normal operation of the plant.

The future checking of the new wage system should concentrate on the organization of work, particularly that of the workers paid by hourly wages, so that the higher level of wages corresponds to the growth of the output and the labor productivity. There is a difference of opinion on whether there has been a rise or a drop in the output achieved by these workers, but the achieved results of the plan fulfillment prove that, on the whole, there was no decline, and that, on the contrary, there was a rise. We cannot base our analysis on individual cases affected by labor morale and other factors. The new wage system requires better organizational work of the section managers (revirnik) and foremen; this fact is not a shortcoming of the new system; on the contrary, it is its positive effect.

It was necessary to solve a number of questions, proposals, and requirements during the first quarter of the year as an accompanying phenomenon of the new measure. Of importance were comments on the directives concerning the premiums for more difficult working conditions; these comments should be more specified in cooperation with the economists and officers [trade-union?] of the plant. In particular, it was pointed out that, according to the principle, only one premium is to be applied for two difficult conditions; this arrangement handicaps workers in Pribram, who work at high temperatures and high relative humidity as well as in a dusty atmosphere, as compared with the workers of other plants working usually under only one of these conditions, such as dusty atmosphere, and usually not as bad.

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Also the classification of difficult and physically strenuous work, such as manual unloading of ore, coal, and other heavy materials from freight cars, as belonging in the fourth wage schedule was criticized. It does not correspond to the nature of physical hardship or prevent the enterprises from introducing technically more justifiable efficiency norms. On the other hand, there have been a number of comments evaluating the principles and measures of the new wage system in a positive way.

Comments and questions of workers are a great help to us, particularly now during the period when the new wage system is being tested; they help to make the system better and more perfect so that it can become an important tool for increasing the material interest of workers in increasing labor productivity, introducing better order in the remuneration of work, and further improving the standard of living of the working people.

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CZECHOSLOVAKIA

South Bohemian Graphite Deposits

[The following is a translation of part of an article entitled "Jihocesky Grafit" by Ladislav Tichy, published in Rudy, Vol VIII, No 3, March 1960, Prague, pages 89-90; CSO: 4182-N/b]

A new survey of the south Bohemian deposits was made after World War II. It was made by workers of the UUG [Ustredni ustav geologicky; Central Geological Institute]; the former ZRP [Zapadocesky rudny pruzkum; West Bohemian Ore Prospecting], now GP [Geologicky pruxkum; Geological Prospecting] in Ceske Budejovice; and the former TD [not identified], now RD [not identified] enterprise in Netolice. The best among the prospected deposits proved to be those located in Cerna v Posumavi-Hurka, Chvalovice-Dolni Chrastany, Kolodeje nad Luznici-Hosty, Domoradice, Vysny, and Blizna. The preliminary prospecting continues in other locations of the Krumlov area.

The Cerna deposit had to be mined quickly because it was located in an area now flooded by the Lipno Dam. A single steep vein was extracted. It yielded a crystalline raw material of very good quality.

The deposits in Dolni Chrastany and Chvalovice in the Netolice area are depleted. They had three horizontal graphite deposits. Only the upper part was mined, in one to three layers. The second and third horizontal deposits were usually developed in the form of intrusions into paragneiss. The quality of these deposits with regard to their size and the number of graphite flakes was one of the best.

The Kolodeje-Hosty deposit near Tyn nad Vltavou is connected with a strip of various rocks which form a separate block in the surrounding slate paragneiss. The deposits are interrupted, forming the eastern, central, and western graphite deposits. The eastern and western parts are roughly of the same size; the central is much smaller. The length exceeds 800 meters. The small-flake raw material contains 11 percent carbon. These deposits are not mined at present.

The Domoradice deposit near Cesky Krumlov forms a strip located between limestone rocks or above them. The graphite strip forms two separated parts, which in some places are very close together and even merge; they are located in the east-west direction at a mean inclination of 45 to 50 degrees to the north. Both parts stretch out to a maximum 12-meter strip; one of them is the main deposit, 0.50 to 6 meters thick; the other is about 0.50 meters thick. The western part of the deposit in its first and second layer is better developed than the part east of the shaft, in both thickness and quality. Amorphous graphite prevails in some places of the eastern section. The raw material is a mixture of medium and small flakes with an amorphous component; its carbon content ranges from 12 to 36 percent. The mine was developed during 1958 and 1959, and actual extraction started in October 1958. The prospecting of the third layer is under way.

The Blizna deposit is south of Cerna v Posumavi, and it has been mined for a long time. It is formed by two graphite-bearing strips in the northeast and southwest directions and a steep northwest inclination. The strips are 200 meters apart. The first strip, stretching beyond the community, is composed of a number of graphite layers attaining a total thickness of over 10 meters. The other strip has only one layer, containing weathered waste rock, and above as well as below it is accompanied by thinner lens-shaped and fragmentary deposits of inferior quality graphite. There is usually one main layer 0.50 to 10 meters thick with two side layers up to one meter in thickness within a 10- to 15-meter range. The other graphite strip was opened for prospecting purposes in 1952 and has been mined since 1958. It yields amorphous graphite with an average carbon content of 42 percent. Both graphite-bearing strips are probably a single deposit separated by tectonic movement and carried by a sigmoidal fold.

The deposit near Vysny north from Cesky Krumlov is composed of four graphite layers trending east-west with a steep northward inclination (55 to 50 degrees). The first and second layers attain a thickness up to five meters; the others about one meter. All layers are probably lens-shaped, and probably two layers can be mined to a longer distance. The local stratigraphy of the Vysna deposit is similar to that of other deposits in the Krumlov area. The raw material is of a purely crystalline nature, with medium and large flakes containing 14 percent carbon.

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The Vysna deposit stretches across Lazec and Cervený Dvůr toward Chválský. It was opened by means of a prospecting gallery and a blind pit. At present no work is done there, but prospecting has not been completed.

Mining operations in the graphite mines are rather difficult because most of the deposits are irregular in thickness--for instance, from 0.10 to 2 meters within a distance of three meters; the layers above and below are not compact (weathered rock) and usually contain a large quantity of water. Sometimes the mine is flooded from these locations, karst caverns, or older portions of the mine. Irregularities of the deposits in direction as well as inclination makes the mining difficult and prevents the use of machinery to the same extent as in other mines, such as ore mines.

We hope that we shall succeed in bringing the mining of our crystalline graphite up to the world level and that we shall continue our work in the best tradition of the south Bohemian graphite, which was world famous during the second half of the 19th century.

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CZECHOSLOVAKIA

Economic Briefs

Pipelines Completed in 1959

In the past year the Plynostav National Enterprise achieved excellent results in the construction of long-distance pipelines and high-pressure connections. Although the state plan scheduled only the completion of the first section, Kladno-Beroun-Rokycany, measuring 31.2 kilometers, the entire 76-kilometer length of the pipeline was finished, fourteen days ahead of time. As of 21 December 1959 it was thus possible to discontinue the industrial and other supply of the town of Rokycany from the carbonization gasworks at Pilsen and to replace it with the supply from the new pipeline. The result benefited and stabilized the gas supply in the town of Pilsen proper.

The fulfillment of the government time schedule, decreed for the construction of the long-distance Klasterec-Karlovy Vary-Sokolov pipeline, in the total length of 46 kilometers and of the respective high-pressure connections resulted in the first step toward the gasification of the northwestern area of Bohemia. The gas supplying pipeline enables the consumer goods industry of this area to use a higher degree of automation; furthermore, the resort town of Karlovy Vary is now in a position to gradually create a dust-free atmosphere by replacing solid fuel with gas fuel. The gas supply from the high-pressure connections of this pipeline to the towns of Sokolov, Klasterec, Ostrov, N. Role, and Kadan improves housing conditions and thus raises the living standard in the towns of our border areas.

The pipeline network of northern and eastern Bohemia will depend on the construction of the important main pipeline across central Bohemia, which will supply gas from the pressure gasworks now being built at Uzin. Last year in this sector we completed the construction of the 29.5-kilometer long Racineves-Uzin gas pipeline, the 16-kilometer long Neratovice-Brandys nad Labem pipeline, and the 15-kilometer long Rudolice-Bilina pipeline. The fulfillment of this task now makes it possible to complete the last section of the central Bohemian main pipeline during this year, to supply gas to the town of Bilina, improve the gas supply to Lovosice,



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and to gain an equalizing accumulation area for the north Bohemian system. In 1959 we completed the construction of pipelines totaling a length of 130 kilometers in various dimensions.

In addition to the construction of long-distance fuel gas supply pipelines, the Plynostav National Enterprise, the general supplier, started the construction of a Czechoslovak crude oil pipeline during the fourth quarter of 1959. This was built outside of the plan but within the available means for mechanization, and the financial volume planned for 1959 was fulfilled. Through close cooperation between building enterprise, general designer, investor, and piping manufacturer, a variety of technological problems have been successfully solved to serve as an example for the further construction of Czechoslovak crude oil pipelines. Among the technological problems are the gauge of pipe terminals, thermal processing of the material during welding, etc.

In 1959 the Plynostav enterprise formed a special work group to design an anticorrosive protection for gas pipelines. The group did not start operating until this year [1960] but its work showed excellent early results, because all pipelines built last year and the major part of the existing pipelines have already been treated with the anticorrosive agent. We have solved the problem of building cathodic protection stations by housing the stations in metal boxes, which are now coming off the production line. We have also solved the problem of replacing small working materials while maintaining the required parameters. The realization of about two million koruny worth of construction investment soon showed favorable results in the adequate protection and longer working time of the pipelines.

(Paliva, Vol XL, No 3, March 1960, Prague, page 90;  
CSO: 3924-N/c)

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We now produce city gas by catalytic separation of natural gas. In 1959 we started operating new separating stations in two gasworks--one station during the third quarter in Brno, and two stations at the end of 1959 in Bratislava.

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These stations are equipped with completely modern production facilities of the "Onia-Gegi" system for separating natural gas cyclically by water steam to obtain city gas in a single process. The valve distributor is hydraulically controlled from one center; the station is amply supplied with measuring and recording devices. The separated gas, after carburization with pure natural gas, may be fed directly into the carbonizing city gas network.

The new production units in the two gasworks will serve as primary and supplementary gas sources.

(Paliva, Vol XL, No 3, March 1950, Prague, page 90;  
CSO: 3924-N/c)

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\* \* \*

One crystalline graphite treatment plant is operating at present in Czechoslovakia in Netolice. Its production technology has been improved. Crushing has been introduced; grinding is done in ball mills, and the concentration of the intermediate product before the final milling is solved by means of hydrocyclones. Flotation in large chambers is now being replaced by mechanical flotation. Kerosene, "flotal A," and boric oil are used as flotation reagents. The treatment plant processes crude graphite flakes containing about 15 percent carbon, and the average content of combustible substances in the concentrate is about 83 to 85 percent. The treatment plant is now under reconstruction.

(Rudy, Vol VIII, No 3, March 1960, Prague, page 96;  
CSO: 4182-N/c)

\* \* \*

Two amorphous graphite treatment plants are operating at present in Czechoslovakia. One operates on the flotation basis complemented by a pyrite separation device and the Mechanobr flotation installation, which can enrich the graphite concentrate up to 55 percent of combustible sub-

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stances. The other plant has replaced the former method entirely by the flotation process and produces concentrates up to 65 percent of combustible substances.

(Rudy, Vol VIII, No 3, March 1960, Prague, page 98;  
CSO: 4182-N/c)

\* \* \*

Five years ago, the first Czechoslovak K-1000 digging-wheel excavator appeared in the Most brown coal strip mines, competing with the traditional German products of Krupp, LMG, and Lauchhamer. It was manufactured in the V. I. Lenin Works (Zavody V. I. Lenina) in Pilsen. The machine weighs 1,200 tons; it has a pull-out jib and is powered by 46 electric motors. The few K-1000 excavators produced showed good results, and our designers modernized its design. Thus, the K-750 type was born. Despite its smaller weight, its output is larger than that of the K-1000 type, and it has also a larger pull-out length of digging wheel. The machine has several improvements: the balancing of the pull-out jib is better, the operation of all four conveyor belts is automatically regulated, and there are additional safety automatic devices which stop the machine immediately when one of the belts is distorted, jammed, or deflected. The digging wheel has two speeds, the higher for soft materials and lower for more difficult ones. The digging wheel is driven over a safety clutch, which starts slipping when the machine is overloaded, regardless of the friction coefficient. The operator's booth on the pull-out jib is placed closer to the engine to prevent vibration of the frame. The output of the K-750 excavator is about 1,550 cubic meters per hour at the lower speed and up to 2,050 cubic meters per hour at the higher speed.

The designers also prepared the T 300 type for smaller strip mines; it is placed on a single caterpillar carriage. The novelty of its design is the electromechanical stretching of the conveyor belts and automatic winding of the cable as the excavator moves. Thus our machine industry left us no debts to pay [sic]; it makes digging-wheel excavators which are the right size for our conditions.

(Technicky magazin, No 3, March 1960, Prague, pages 148-149;  
CSO: 4182-N/d)

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At the beginning of 1958, the Kablo National Enterprise in Bratislava produced a 110 kilovolt oil-pressure cable in a steel pipe. The 150 square-millimeter copper core is wrapped in two layers of semiconductor paper and provided with a paper insulation. The insulation is wrapped in a semiconductor paper and two copper bands. A temporary lead sheathing covers sliding copper wires. The cable is waterproofed [impregnated] by pure mineral oil of a lower viscosity than the cable oil usually applied.

The waterproofing oil used for this purpose was manufactured by the Ostramo National Enterprise in Ostrov and was delivered in 200-liter barrels.

(Elektrotechnicky casopis, No 2, March 1960, Bratislava, pages 109-110; CSO: 4182-N/d)

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Basic Technical Parameters of Modern Universal Analog Mathematical Machines [Table]

Key to Table:

- A. Country of origin
  - B. Make
  - C. Model
  - D. Type [stredni = medium; velky = large; maly = small]
  - E. Dimensions (height, width, depth) and weight
  - F. Power input and feeding system [pri = at; jednofaz = single phase; trojfaz = three-phase]
  - G. Maximum calculation capacity
  - H. Method of operation
  - I. Precision [az = to]:
    - a) linear
    - b) nonlinear
  - J. Direct-current amplifier:
    - a) number
    - b) drift [za den = per day; za hod = per hour]
    - c) range of outlet voltage [pri zatezi = at load]
    - d) gain
    - e) marginal frequency
  - K. Setting of coefficients and initial conditions
  - L. Multiplier device
  - M. Functional units
  - N. Control circuits
  - O. Source
1. Czechoslovakia:
- G. Simple linear differential equations on the order of 10; some nonlinear differential equations on the order of 6.
  - H. Instantaneous or repetitious with outer time base.
  - K. 20-layer potentiometers (large) + fine; setting of servocompensators according to a precision spiral potentiometer
  - L. One, diode, four-quadrant multiplier with a 2 percent precision
  - M. Four symmetrical and four asymmetrical diode limitators, two diode quadrators
  - N. Servocompensator with a spiral potentiometer and a scale with the possibility of subtracting 0.5 percent.
  - O. + 230 volts--150 volts--300 volts, electronically stable. Reference voltage:  $\pm 100$  volts stabilized at one percent.

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K	L	M	N	O
Nastavování koeficientů a počátečních podmínek	Násobníky	Funkční jednotky	Kontrolní obvody	Nápadný zdroje
20 vstředových potenciometrů (hrubý + jemný); nastavování servokompensátorů podle přesného spirálního potenciometru	1 diodová, čtyřkvadrantová s přesností 2%	4 asymetrické a 4 nesymetrické diodové omezovače, 2 diodové kvadranty	Servokompensátor se spirálním potenciometrem a stupnicí s možností odečítání 0,5%	+250 V, -150 V, -300 V elektronicky stabiliz. Referenční napětí ±100 V, stabilizované na 1%
36 přesných potenciometrů; nastavování nepojitě na 2500 bodů	4 diodové kvadranty	4 diodové generátory funkcí s lineární aproximací	Indikátory napětí a nastavení nuly	Neospecifikovaný Unspecified
24 potenciometrů; nastavování podle vestavěného 1000 otáčekového spirálního potenciometru	12 elektronických nebo elektromechanických s přesností 0,2%	10 diodových a triodových funkčních generátorů, 8 jednotek pro napodobení pásmu nečistoty a omezení	Neospecifikovaný Unspecified	Neospecifikovaný Unspecified
60 triodových spirálních potenciometrů	4 šestnáctibitové servonásobky s lineární nebo funkčními potenciometry s přesností 0,5%	4 neuzemněné potenciometry a 4 diody pro napodobení nelineárních funkcí	Indikace přetížení zesilovačů, potenciometr (0,1%), měř. přístroj pro kontrolu výstupní a nastavení koeficientů	Stabilizované zdroje ±300 V, 400 mA Referenční zdroj ±100 V, 0,2%
14 přesných desítkových potenciometrů (0,1%)	4 šestnáctibitové servonásobky s lineárními nebo funkčními potenciometry s přesností 0,5%	2 diodové funkční generátory a 4 diodové omezovače napodobující nelineární funkce	Indikace přetížení zesilovačů, voltmetr s rozsahem do 150,00 V a přesností 0,01%	Stabilizované zdroje ±300 V, 900 mA Referenční zdroj ±100 V, 200 mA, 0,1%
20 jednoúčkových potenciometrů (2%)	V základním vybavení žádná	V základním vybavení žádná	Indikace driftu a přetížení zesilovačů Vestavěná 800 základna pro pozorování fázování na osciloskopu	Stabilizované zdroje ±400 V Stabilizované referenční napětí ±100 V
36 třídekádových přepínacích odporů; nastavování v rozsahu 0,100 až 1,000	Max 6 diodových čtyřkvadrantových s přesností 1%	Max 6 diodových funkčních jednotek s přesností 1% Přidáván nepojitě funkční generátory	Indikace přetížení zesilovačů 0,35% Kontrolní měřicí přístroj	Vysokonábovová stabilizace 0,35% Niskonábovová stabilizace 0,03%
20 drátových potenciometrů 50 kΩ; nastavování podle stupnic s přesností 1%	Žádná	Žádná	Vestavěná dvojpaprovková obrazovka o průměru 9 cm	Vnější elektronicky stabilizovaný zdroj
60 potenciometrů pro nastavení koeficientů a 24 pro počít. podmínky; nastavování podle stupnic 10% nebo vestavěného normálu (0,1%)	Na zvlášť. požadavek diodová nebo servomechanická s přesností 0,1%	Na zvlášť. požadavek diodový generátor funkcí, diodové omezovače, funkční potenciometry se 60 odbočkami	Indikace přetížení zesilovačů Měřicí pro nastavení koeficientů	Stabilizované zdroje ±250 V a -100 V (0,1%)
18 + 12 potenciometrů; nastavování podle stupnic 10% nebo vestavěného normálu (0,1%)	Na zvlášť. požadavek diodová nebo servomechanická s přesností 0,5%	Na zvlášť. požadavek diodový generátor funkcí diodové omezovače	Indikace přetížení zesilovačů Měř. přístroj pro kontrolu zesilovačů, zdroj a nastavování koeficientů	Stabilizované zdroje ±250 V a -400 V Stab. referenční zdroj ±100 V (0,1%)
28 potenciometrů; nastavování podle přesného potenciometru	Žádná	Žádná	Indikační přístroj s nulou uprostřed; 2 přesné 1000 otáčekové potenciometry	Nápadný napětí tranzistorů, stabilizovaná na 1% Referenční zdroj ±20 V, 60 mA, stab. 1%
18 spirálních potenciometrů; nastavování podle stupnic	Žádná	Žádná	Indikace přetížení zesilovačů Oscilátor pro řízení opakované činnosti (0,1 až 100 stříln.) Vnější měřicí přístroje	Neospecifikovaný Unspecified
30 potenciometrů; nastavování podle 2 přesných 1000 otáčekových potenciometrů	Žádná	Žádná	Rutkový indikátor 2 srovnávací potenciometry Oscilátor 0,5 až 6 Hz pro řízení opakované činnosti	Stabilizované zdroje ±250 V a -450 V Stab. stabilizované referenční napětí ±100 V

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Převod	B	C	D	E	F	G	H	Převod							I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB	JC	JD	JE	JF	JG	JH	JI	JJ	JK	JL	JM	JN	JO	JP	JQ	JR	JS	JT	JU	JV	JW	JX	JY	JZ	KA	KB	KC	KD	KE	KF	KG	KH	KI	KJ	KL	KM	KN	KO	KP	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD	ME	MF	MG	MH	MI	MJ	MK	ML	MN	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX	MY	MZ	NA	NB	NC	ND	NE	NF	NG	NH	NI	NJ	NK	NL	NM	NN	NO	NP	NQ	NR	NS	NT	NU	NV	NW	NX	NY	NZ	OA	OB	OC	OD	OE	OF	OG	OH	OI	OJ	OK	OL	OM	ON	OO	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY	XZ	YA	YB	YC	YD	YE	YF	YG	YH	YI	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS	YT	YU	YV	YW	YX	YY	YZ	ZA	ZB	ZC	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW	ZX	ZY	ZZ																																																		
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2. USSR:

- G. Simple differential equations on the order of 6.
- H. Repetitious
- L. Four diode multiplier with quadrators
- M. Four diode generators of functions with linear approximations.
- N. Voltage indicators and zero setting

3. USSR:

- G. Simple differential equations on the order of 32
- H. Instantaneous or repetitious
- K. 36 precision potentiometers; disconnected setting of 2,500 points
- L. 12 electronic or electromechanical with 0.2 percent precision
- M. 10 diode and triode function generators, six units for imitating the zone of insensitiveness and limitation

4. Great Britain:

- G. Linear differential equations on the order of 5. Simultaneous differential equations on the order of 2 and 3 with three variables. Simultaneous linear algebraic equations of higher order with three variables.
- H. Repetitious with a repetition period of 1.2 or 5 seconds
- K. 24 potentiometers. Setting according to a built-in 10-revolution spiral potentiometer
- L. One sixfold servomultiplier with a linear or functional potentiometer with a precision of 0.5 percent
- M. Four unlocked potentiometers and four diodes for the imitation of nonlinear functions
- N. Amplifier overloading indicator, potentiometer (0.1 percent), measuring instrument for the control of outlets and setting of coefficients
- O. Stabilized sources:  $\pm 300$  volts, 400 megamperes. Reference source:  $\pm 100$  volts; 0.2 percent

5. Great Britain:

- G. Linear and nonlinear simultaneous or simple differential equations of higher order
- H. Instantaneous or repetitious
- K. 60 three-revolution spiral potentiometers
- L. Four sixfold servomultipliers with a linear or functional potentiometer with a precision of 0.5 percent.
- M. Two diode function generators; four diode limiters imitating nonlinear functions



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- N. Amplifier overloading indicator, numerical voltmeter with a range up to 159.99 volts and precision of 0.01 percent
  - O. Stabilized sources:  $\pm 300$  volts, 900 megamperes. Reference source:  $\pm 100$  volts, 200 megamperes; 0.1 percent
6. Great Britain:
- G. Linear and nonlinear differential equations of higher order
  - H. Instantaneous in actual time
  - K. 14 precision 10-revolution potentiometers (0.2 percent); 20 one-revolution potentiometers (2 percent)
  - L. None in the basic equipment
  - M. None in the basic equipment
  - N. Drift and amplifier overloading indicator. Built-in time base for the observation of solution on an oscilloscope
  - O. Stabilized source:  $\pm 400$  volts; stabilized reference voltage:  $\pm 100$  volts
7. Great Britain:
- G. Three to four differential equations on the order of 2, or one or two differential equations of a corresponding higher order
  - H. Instantaneous with a two-hour solution time, or repetitive with a repetition period of 15, 5, 1.5, or 0.5 seconds
  - K. 36 three-decade switch resistors within a range of 0.100 to 1.099
  - L. Maximum six diode- four-quadrant multipliers with a percent of one percent
  - M. Maximum six-diode function units with a one percent precision. Disconnected function generator may be added.
  - N. Amplifier overloading indicator, built-in time base. Control measuring instrument.
  - O. High-voltage stabilization: 0.25 percent; Low-voltage stabilization: 0.02 percent.
8. Great Britain:
- G. Not specified
  - H. Repetitious
  - J. b) Without compensation; 10-megavolt short
  - K. 20-wire potentiometers with 50 kilohms; setting according to a scale with one-percent precision
  - N. Built-in 9-centimeter two-radial picture tube
  - O. Outside electronically stabilized source

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9. France:

- G. Linear equations with eight unknowns and six differential equations on the order of 2 with linear or non-linear coefficients
- H. Instantaneous with actual time
- K. 60 potentiometers for setting coefficients and 24 for the initial conditions. Setting according to a scale (2 percent) or a built-in normal (0.1 percent)
- L. Diode or servomechanical multiplier on special request; with precision of 0.1 percent
- M. Diode function generator, diode limitators, function potentiometers with 60 branches on special request
- N. Amplifier overloading indicator. Measuring device for setting coefficients
- O. Stabilized source:  $\pm 250$  volts and  $- 400$  volts (0.1 percent)

10. France:

- G. Three complete differential equations on the order of 2, with constant coefficients; linear algebraic equations up to six unknowns
- H. Instantaneous with actual time
- K. 18 + 12 potentiometers; setting according to a scale (2 percent) or built-in normal (0.1 percent)
- L. Diode or servomechanical multiplier on special request
- M. Diode function generator, diode limitators on special request
- N. Amplifier overloading indicator. Measuring instrument for controlling amplifiers, sources, and setting of coefficients
- O. Stabilized source:  $\pm 250$  volts and  $- 400$  volts.  
Stabilized reference source:  $\pm 100$  volts (0.1 percent)

11. France:

- H. Repetitious with a frequency of 2 or 10 Hertz
- K. 28 potentiometers. Setting according to a precision built-in potentiometer
- N. Indicator instruments with the zero in the middle; two precision 10-revolution potentiometers
- O. Feed voltage for transistors, stabilized at one percent; reference source:  $\pm 20$  volts, 60 megamperes, stabilized at one percent

12. Switzerland:

- H. Repetitious
- K. 16 spiral potentiometers; setting according to a scale
- N. Amplifier overload indicator. Oscillator for controlling repeated operations (0.1 to 100 seconds). Outside measuring instruments

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13. USA:

- H. Repetitious or instantaneous
- K. 30 potentiometers; setting according to two precision 10-revolution potentiometers
- N. Pointer indicator; two comparative potentiometers; 0.6 to 6 Hertz oscillator for controlling repeated operations
- O. Stabilized source:  $\pm$  250 volts and - 450 volts.  
Electronically stabilized reference voltage:  $\pm$  100 volts.

(Automatizace, No 4, April 1960, pages 106-107; CSO: 4199-N/b)

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Mercury Rectifiers for Railroads

The Stalingrad Plant of the CKD [Ceskomoravska-Kolben-Danek] in Prague has made a new type of mercury rectifier for the electrification of railroads. It is air-cooled with built-in ignitrons. It has a constant output of 3.3 megawatts and can operate at 4.95 megawatts for two hours, which is the highest output in the world. The CKD in Prague is the first enterprise to manufacture air-cooled built-in ignitrons.

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